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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Hoffman, Wasson & Gitler, P.C.
Crystal Center 2 - Suite 522
2461 South Clark Street
Arlington, VA 22202

EXAMINER	
KINGAN, TIMOTHY G	
ART UNIT	PAPER NUMBER
1797	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/762,563	PETERS ET AL.	
	Examiner	Art Unit	
	TIMOTHY G. KINGAN	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 January 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23 and 27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23 and 27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *07/19/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1-10 and 20 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over M. Seki et al., U.S. Patent Application Publication 2002/0195463 (herein after Seki).

For Claims 1, 5, 7, 9, 20 and 23 Seki teaches microchips [0050] (a carrier) with first and third flow channels [0054] (reads on first and second channels of the instant claim), defined on the top of the base plate [0052] (made as cavities), the first flow channel having first and third ports for charging or discharging liquids ([0055], Fig. 2a. **16**, **22**, **18a** and **18c**) (first channel has one inlet and one outlet, the inlet reservoir upstream of the inlet to the first channel and the outlet reservoir downstream of the outlet of the first channel), the third channel intersecting with the first channel and

linking the first and second channels (second channel forming flow path with fluidic outlet) [0053].

Seki is silent on the capillarity of the outlet with respect to the inlet; however, Seki teaches liquid introduced into the inlet is drawn into the channel by a capillary phenomenon [0085]. Further, Seki teaches a plurality of third channels (second channels of the instant claim) branch sequentially from the first channel (first channel divided into sections to form a first channel system) [0109] and that the third channels draw liquid into it from the first channel by means of a stronger capillary attraction force through the opening of the third channel (second channels having greater capillary force than the first at the branch points) [0087] and that all third channels fill from the first channel [0110]. It would have been obvious to one of ordinary skill in the art, from the teaching of Seki on greater capillarity in the third channels, that fluid introduced at one end of the first channel would fill sequential third channels after the preceding channel was filled, since fluid flow would be directed first based on capillarity. Further, for apparatus claims, the courts have held that if the prior art structure is capable of performing the intended use, then it meets the claim. Apparatus claims must be structurally distinguishable from the prior art in terms of structure, not function. The manner of operating an apparatus does not differentiate an apparatus claim from the prior art, if the prior art apparatus teaches all of the structural limitations of the claim (see MPEP § 2114 & § 2173.05(g)). Here, the limitation on the order of filling of second channels comprises a step in a manner of operation.

For Claim 2, Seki does not specifically teach introducing changing capillarity at intersection of the second and first channels by changing surface properties of walls. However, Seki does teach the third flow channel may be made hydrophilic (with respect to the first channel) as a control mechanism for liquid flow [0030]. It would have been obvious to one of ordinary skill in the art, from such teaching, to use a change in the hydrophilicity at the intersection of first and second channels in order to use the well known property of boundaries with respect to hydrophilicity or hydrophobicity to direct flow.

For Claims 3 and 4, Seki teaches that the liquid is pulled through the first channel into and through the third channel from top to bottom by virtue of changing cross sectional area (changing geometric properties at the transition from the first to the second channel) [0087]-[0089], but when the liquid reaches the bottom of the third channel is does not pass out, by virtue of changing cross sectional areas (second channels begin at branch points and end a means for stopping liquid flow) [0090]-[0091].

For Claims 6, 8 and 10, Seki does not specifically teach the relative capillarities of inlet and outlet reservoirs with respect to the first channel or a gradient of capillarity between the sections of the first channel. However, Seki does teach liquid introduced into the inlet is drawn into the channel by a capillary phenomenon [0085]. It would have been obvious to one of ordinary skill in the art, from such teaching, to use an increasing gradient of capillarity when dictated by the dimensions of the first channel, in order to

ensure movement of fluid in the desired direction without need for application of external force.

For Claims 11 and 12, Seki does not specifically teach second channels (third channels in Seki) divided into sections to form a second channel system. However, Seki does teach a System I, comprising third and second channels, the second channel for accepting fluid from the third channel ([0136], Figs. 10d-10e; see also Fig. 14 for a sectioned third channel), such sections being equivalent to a multi-section channel in serving liquid transfer (second channels divided into sections to form a system). Further, Seki teaches stopping means in third channels in the form of changing cross sectional areas at the intersections of third and second channels [0090]-0091]. Seki does not teach the capillarity of the third channel as far as the stopping means. However, Seki does teach the third flow channel may be made hydrophilic (with respect to the first channel) as a control mechanism for liquid flow [0030]. It would have been obvious to one of ordinary skill in the art, from such teaching, to use a change in the hydrophilicity in the third channel in order to use the well known of hydrophilicity to maintain fluid flow in the absence of an external force.

For Claim 13, Seki does not teach the connection of one third channel at a time to the stopping means. However, Seki teaches flow to a second channel (third channel of the instant claim), which itself comprises a stopping means, such flow and connection occurring sequentially (one at a time) with a plurality of second channels. Further, the language of the claim comprises a step in a method; for apparatus claims, the courts have held that if the prior art structure is capable of performing the intended use, then it

meets the claim. Apparatus claims must be structurally distinguishable from the prior art in terms of structure, not function. The manner of operating an apparatus does not differentiate an apparatus claim from the prior art, if the prior art apparatus teaches all of the structural limitations of the claim (see MPEP § 2114 & § 2173.05(g)).

For Claim 14, Seki does not teach the capillarity of third channels with respect to second channels. However, Seki does teach control mechanisms for movement of trace quantities of liquid by means of a capillary phenomenon [0018]. It would have been obvious to one of ordinary skill in the art to use appropriate relative capillarity in the desired direction of liquid flow for maintaining such flow.

For Claim 15, Seki teaches the role of relative channel cross sectional areas in determining capillarity ([0020], [0022], [0088]-[0090]), the intersection of Seki's third and second channel comprising a capillary stop by virtue of changing cross sectional areas ([0088]-[0090]).

4. Claims 16, 17-18 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seki as applied to claims 12, 13 and 1, respectively, above, and further in view of P. Andersson and G. Ekstrand, U.S. Patent Application Publication 2003/004322 (herein after Andersson).

For Claim 16, Seki does not specifically teach use of microvalves as stopping means. However, such structure for controlling flow is known in the art. Andersson teaches microfluidic devices for preparing aliquots of an input liquid (abstract) with primary and secondary channels; one such structure employs locally changing

interaction energy between an aliquot and a surface of a conduit [0068] and is referred to as a capillary valve or passive valve [0070]. This stopping means is equivalent to channel fluid control by changing cross sectional area, as found in the teaching of Seki.

For Claim 17, Seki does not teach each third channel having one second outlet. However, such structures are known in the microfluidic art for providing aliquots. Anderrson teaches microfluidic devices with distributed fluid flow comprising secondary channels with outlet ports ([0095], [0119]). It would have been obvious to one of ordinary skill in the art to use the outlets of Anderrson in the device of Seki in order to provide a number of functions including collection of aliquots, passage to waste and venting.

For Claim 18, Seki does not teach a microvalve or capillary stop at the second outlet. Anderrson teaches outlets comprising anti-wicking means/valves (microvalves) at such outlets [0106], Fig. 2a, **221e**). It would have been obvious to one of ordinary skill in the art to use the valves of Anderrson in the device of Seki in order to provide for movement of liquid in response to a controlling means comprising a step in a procedure as well as to prevent backflow.

For Claim 22, Seki does not teach aeration channels at a branch point in the first channel. However, Anderrson teaches the importance of venting microconduits to allow displacement of air with incoming liquid [0100]. Further, Anderrson teaches multiple inlet vents intersecting the first channel and connected to ambient via a common venting channel ([0116]; Fig. 2a, **208** and **209**) (aeration channel in the first channel in the area of a branch point). It would have been obvious to one of ordinary skill in the art to use

the venting means of Anderrson in the device of Seki in order to provide for displacement of air with incoming liquid, according to the teaching of Anderrson.

5. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Seki as applied to claim 1 above, and further in view of Anderrson and G. Kellogg et al., U.S. Patent Application Publication 2002/0150512 (herein after Kellogg).

For Claim 19, Seki does not teach meander-shaped channel systems of outlet reservoirs. However, such structures are known in the art. Anderrson teaches meander-form microconduits ([0145] Fig. 3a, 301) (first channel system) as well as second channel system (Fig. 2a, **202**). Further, Kellogg teaches such curved channels can reduce the incidence of aerosol production [0254]. It would have been obvious to one of ordinary skill in the art to use the meander-shaped channels of Anderrson in the device of Seki in order to reduce aerosol production, according to the teaching of Kellogg, or to provide for improved packing efficiency of an increased channel length or to provide control over capillarity.

6. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Seki as applied to claim 1 above, and further in view of M. Jakobsen and L. Kongsbak, U.S. Patent Application Publication 2003/0152927 (herein after Jakobsen). Seki does not teach inclusion of absorbent material in channels or the outlet reservoir. However, use of absorbent material is known in the microfluidic art; Jakobsen teaches closed analysis

slides with channels (microfluidic devices) and inclusion of absorbent material in the waste area of such devices for soaking up waste fluid and preventing backflow. It would have been obvious to one of ordinary skill in the art to use the absorbent material of Jakobsen in the device of Seki in order to provide the known advantages as taught by Jakobsen or to promote directionality of fluid flow.

7. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Seki as applied to claim 1 above, and further in view of G. Kellogg et al., U.S. Patent 6,143,248 (herein after Kellogg ‘248).

For Claim 27, Seki does not teach second channels with a cavity in the form of a recess. However, such structural elements are known in the art. Kellogg '248 teaches microfluidic devices comprising microchannels for applications such as chemical analysis and synthesis (col 31, lines 59-60) which may have incorporated recesses for installation or carrying of control devices (col 32, lines 30-34). It would have been obvious to one of ordinary skill in the art to use the recesses of Kellogg ‘248 in the device of Seki in order to provide capabilities for enhancing control over fluid flow such as resistive networks comprising heating areas, according to the teaching of Kellogg ‘248.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TIMOTHY G. KINGAN whose telephone number is

(571)270-3720. The examiner can normally be reached on Monday-Friday, 8:30 A.M. to 5:00 P.M., E.S.T.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on 571 272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TGK

/Jill Warden/
Supervisory Patent Examiner, Art Unit 1797